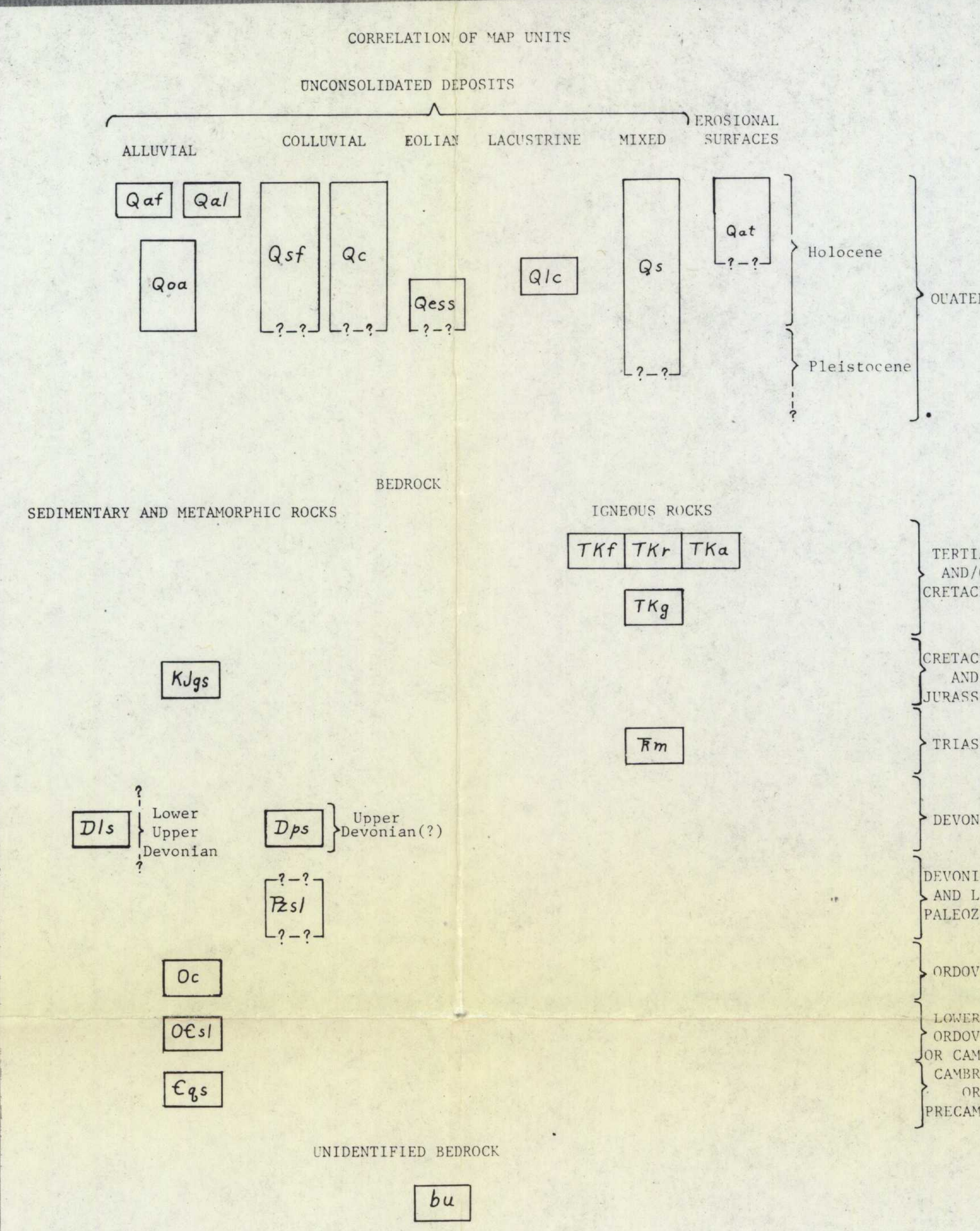
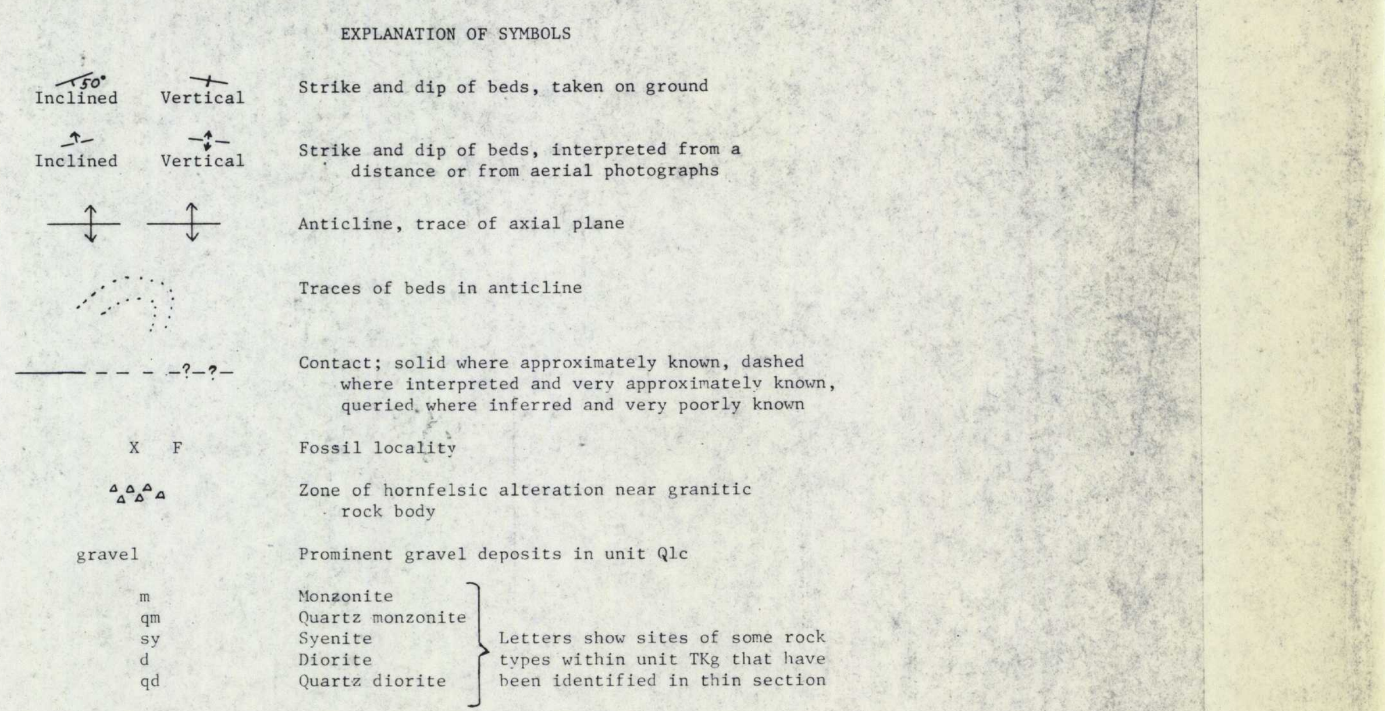
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

OPEN FILE MAP
75-351

KANTISHNA RIVER


CORRELATION OF MAP UNITS
UNCONSOLIDATED DEPOSITS
ALLUVIAL
COLLUVIAL
EOLIAN
LACUSTRINE
MIXED
EROSIONAL SURFACES
Qaf
Qal
Qoa
Qsf
Qc
Qess
Qlc
Qs
Qat
Holocene
Pleistocene
QUATERNARY
BEDROCK
SEDIMENTARY AND METAMORPHIC ROCKS
IGNEOUS ROCKS
TKf
TKr
TKa
TKg
TERTIARY AND/OR CRETACEOUS
KJgs
CRETACEOUS AND JURASSIC(?)
TRIASSIC(?)
Dls
Lower Upper Devonian
Dps
Upper Devonian(?)
DEVONIAN
Pzsl
DEVONIAN(?) AND LOWER PALEOZOIC
Oc
ORDOVICIAN
OƐsl
Ɛgs
LOWER ORDOVICIAN(?) OR CAMBRIAN(?)
CAMBRIAN OR PRECAMBRIAN(?)
UNIDENTIFIED BEDROCK
bu


EXPLANATION OF SYMBOLS
Inclined
Vertical
Strike and dip of beds, taken on ground
Strike and dip of beds, interpreted from a distance or from aerial photographs
Anticline, trace of axial plane
Traces of beds in anticline
Contact; solid where approximately known, dashed where interpreted and very approximately known, queried where inferred and very poorly known
Fossil locality
Zone of hornfelsic alteration near granitic rock body
gravel
Prominent gravel deposits in unit Qlc
m
qm
sy
d
qd
Monzonite
Quartz monzonite
Syenite
Diorite
Quartz diorite
Letters show sites of some rock types within unit TKg that have been identified in thin section

INTRODUCTION

This report is preliminary and based on 10 days of helicopter-supported reconnaissance geologic work done by the authors in July 1974, one day of similar work by R. M. Chapman, William P. Brosgé, and Hillard N. Reiser in August 1973, and on observations and interpretations made from the air and from vertical aerial photographs. Thin sections were examined by Michael L. Throckmorton and his contribution is gratefully acknowledged. Tribute is due to H. M. Eakin who, in 1915, did the only previous reconnaissance geologic mapping in this area (Eakin, 1916 and 1918). The quality of his geologic mapping, which was done under very arduous conditions, is excellent. The recent mapping considerably enlarges the coverage of this area, and we differ with a few of Eakin's age interpretations because of much new information.

Ground stations and some 0.5 to 2 km (0.3 mile to 1.25 miles) traverses were made by the authors at about 100 sites in this half of the quadrangle, but a detailed geologic investigation was not possible in the 11 field days. Vegetation and soil cover are thick and widespread in this area, and they conceal much of the bedrock and unconsolidated deposits. Also, helicopter landing sites within convenient reach of many outcrops, particularly in the lower parts of the area, are relatively scarce. Therefore, much remains to be learned about the geology, and critical geologic data in the heavily covered parts of this area probably cannot be obtained by conventional field methods.

DESCRIPTION OF MAP UNITS

UNCONSOLIDATED DEPOSITS

ALLUVIAL

Qal RECENT ALLUVIUM.--Sandy gravel and sandy silt, coarse clasts subrounded to well rounded. Frequently mantled with as much as 1 m (3 feet) of silt. Represents flood plain of modern rivers and streams.

Qaf RECENT FAN DEPOSITS.--Gravel, silt, and sand, coarse clasts subangular to subrounded; commonly occurs at the mouths of small side canyons.

Qoa OLDER ALLUVIUM.--Sandy gravel and sandy silt. Generally mantled with 0.3 to 2.0 m (1-6 feet) of silt. Represents old flood plains of rivers and streams.

COLLUVIAL

Qsf SOLIFLUCTION MANTLE.--Silt, some sand, and a small amount of angular fragments of bedrock. Moves slowly downslope in summer when thawed, producing streamline topography. Probably makes up a considerable portion of the material mapped as Qs (silt).

Qc COLLUVIUM, UNDIFFERENTIATED.--Predominantly silt, with some larger rock fragments that range up to boulder size, commonly poorly sorted. Occurs along valley sides and valley flats. Derived mainly from valley sides by slow downslope soil creep.

EOLIAN

Qess SAND AND SILT.--Occurs predominantly as elongate dunes trending NE-SW. Boundary with Qs (silt) frequently indistinct.

LACUSTRINE

Qlc CLAY, SILT, SAND AND GRAVEL.--Well bedded lake deposits, flat-lying, thin-bedded. Carbonized wood-rich material present at 2 horizons within the section; present only in the Chitanana River drainage basin. At least 60 m (200 feet) thick.

EROSIONAL SURFACES

Qat ALTIPLANATION TERRACE.--Flat, even surface, cut on bedrock in high areas; commonly possesses thin mantle of coarse, angular rock rubble. Individual terraces are generally less than 2 hectares (5 acres) in area.

MIXED ENVIRONMENT

Qs SILT.--Probably includes both loess and solifluction mantle (Qsf). Generally poorly drained. Lakes are common, separated by low, elongated hills which are probably dunes.

BEDROCK

SEDIMENTARY AND METAMORPHIC ROCKS

KJgs GRAYWACKE AND SHALE.--Sandstone, siltstone, and shale, medium gray, generally thin bedded; minor amount of granule to small pebble conglomerate. Rocks are similar to those in the Cretaceous and Jurassic(?) units in the Livengood quadrangle (Chapman and others, 1971) and in the southeastern part of the Tanana quadrangle; age is assigned on this basis. Thickness unknown.

Dls LIMESTONE AND SILTSTONE.--Chiefly limestone, medium to medium dark gray, weathers light to very light gray or tan, recrystallized in part, dolomitic in part; forms prominent sparsely-vegetated ridges. Siltstone is medium gray, shaly to phyllitic and in part calcareous. Age is almost certainly early Late Devonian (Frasnian), based on identifications by W. A. Oliver, Jr., of *Phillipsastrea* or *Pachyphyllum* sp. (a massive rugose coral), *Favosites*? sp., *Thamnopora* sp., and *Disphyllum*? sp., which were collected from the only known fossil locality (8 miles south of Redlands Lake). Unit, as mapped, may include some similar rocks of undetermined ages. Thickness unknown, but probably at least 150 m (500 feet).

Dps PHYLLITE, SLATE, SILICEOUS SILTSTONE AND ARGILLITE.--Light and medium gray to silvery gray, weather to various shades of gray and tan; altered to hornfels close to contact with granitic rocks (TKg). Includes some thin limestone and calcareous siltstone; may be gradational with the limestone and siltstone (unit Dls) and probably overlies this unit but the structural relationship is uncertain. Thickness is not known.

Oc CHERT AND SLATE.--Medium to medium dark gray, and in minor part varicolored; weather to various shades of light yellow, tan and orange. Chert is the major rock and forms many prominent barren and semi-barren ridges throughout the belt of outcrop. Complex folds and steep south dips are abundant; some beds may be overturned. Age is inferred to be Ordovician on the basis of similarity to the chert and siliceous shale unit (nc) in the Dugan Hills (Péwé and others, 1966), which is believed to be correlative with the chert unit in the Livengood area that has been reidentified as Ordovician (U.S. Geol. Survey, 1972). Thickness unknown, but probably is at least 600 m (about 2,000 feet).

OƐsl SILTSTONE, LIMESTONE, PHYLLITE AND CHERT.--Rocks are mostly light-medium to dark gray and weather to various shades of yellow, brown and gray; generally thin bedded and in relatively thin interbedded units. Siltstone is commonly siliceous and is sandy in part; limestone is light to dark gray, very finely crystalline, dolomitic in part; phyllite is generally medium silvery gray but includes some dark gray graphitic beds, and in parts grades either to shale or slate; chert or metachert is medium-dark gray and is relatively rare. The red and green argillaceous rocks mentioned by Eakin (1918, p. 29-30) were not found in the 1974 work; they are probably poorly exposed but form a part of this unit. It is likely that more rocks of this unit than have been mapped are present in this area; owing to complex structure, poor and inaccessible outcrops, and lack of time for detailed mapping, some of these rocks may be included in the underlying quartzite, metasiltstone, slate and grit unit (Ɛgs). Age is interpreted to be Early Ordovician or Cambrian, and a correlation is inferred with part of the grit, argillite, quartzite and limestone unit (ng) in the Dugan Hills (Péwé and others, 1966) and with the argillite, slate, quartzite, siltstone and limestone unit (Ɛal) in the Livengood quadrangle (Chapman and others, 1971). Thickness is unknown.

Ɛgs QUARTZITE, METASILTSTONE, SLATE AND GRIT.--In general these rocks range from light to dark gray, and weather to various shades of brown, reddish brown and grayish brown; iron and manganese(?) stain and coatings are common. Quartzite is commonly light to medium gray, micaceous, very fine grained and grades to a metasiltstone; blocky, irregular fractures, schistose in part; grit beds are similar and relatively rare. Slate and phyllite are light-medium to dark-medium gray and greenish gray, banded with thin silty or sandy layers in part. Rocks of this unit in the highest and central part of Bitzshtini Mountains are heavily iron stained and cut by many small felsic dikes and milky quartz veins; these rocks around the granitic stack at Haystack Mountain are altered to hornfels. Age is interpreted to be Cambrian (possibly Precambrian), and the unit is similar to, and inferred to be correlative with, part of the grit, argillite, quartzite and limestone unit (ng) in the Dugan Hills (Péwé and others, 1966) and with the grit, quartzite, slate and argillite unit (Ɛgq) in the Livengood quadrangle (Chapman and others, 1971). Thickness is unknown, but probably is at least 600 to 1,000 m (2,000 to 3,300 feet).

Pzsl SCHIST, PHYLLITE, LIMESTONE AND GREENSTONE.--Schist and phyllite are light to medium green and light to medium gray with silvery sheen, weather light gray and reddish brown; chlorite and mica common, partly calcareous, intensely folded, interbedded with limestone. Limestone is light and medium gray and in part greenish gray, weathers commonly to light tan and medium reddish brown, largely recrystallized; sandy in part; generally in relatively thin units interbedded with chloritic schist and phyllite. Greenstone is basaltic, light to medium green, probably gradational to greenschist; less common than the other rock types. Unit is identified only in area just west of head of Chitanana River. Age is uncertain; probably older than the limestone and siltstone unit (Dls). Thickness is unknown.

IGNEOUS ROCKS

TKf FELSIC EXTRUSIVE ROCKS AND TUFF.--Generally very light to light gray, yellow, and pink to red, mostly deeply weathered and in part iron stained. Rhyolitic and andesitic rocks are very fine grained to aphanitic, porphyritic in part; some breccia with small fragments of medium green basaltic(?) rock; tuff is very fine grained and looks similar to the rhyolitic rocks; possibly some welded tuff. Age uncertain but believed to be no older than granitic rocks (TKg); unit appears to be undeformed and nearly flat lying, and caps the ridges that extend south from the Chitanatala Mountains. Some siltstone and chert (bu) occur as rubble within this rock unit, and these, in part at least, apparently are part of an older underlying unit. Thickness probably ranges from a few tens of metres to at least 100 m (about 30 to 300 feet).

TKr RHYOLITIC VOLCANIC ROCKS.--Rhyolite(?) porphyry is light to very light gray, mostly deeply weathered to light to medium yellow and reddish brown with abundant iron stain; mostly very fine grained; small phenocrysts of smoky quartz and kaolinized feldspar. Mapped only in southwest corner of map. Age uncertain; unit probably is closely allied with the felsic extrusive rocks and tuff (TKf) and is no older than the granitic intrusive rocks (TKg).

TKa ANDESITIC VOLCANIC ROCKS.--Andesite and trachyandesite are medium to light green and grayish green and weather to a dull medium brown and brownish green; fine and very fine grained, porphyritic and glomeroporphyritic, abundant plagioclase phenocrysts 5-6 mm (about 0.25 inch). Unit mapped only in southwest corner of map. Age uncertain; unit probably is closely related to units TKf and TKr, which are discussed above.

TKg GRANITIC ROCKS.--This unit includes monzonite (m), quartz monzonite (qm), syenite (sy), diorite (d), and quartz diorite (qd), which have been identified in thin section; these sample sites are shown on the map by the letter symbols. Minor amounts of rhyolite, andesite and other igneous rocks also are included in this unit, and more detailed fieldwork would be required to define the types and distribution of the various igneous rocks. The rocks generally range from light to medium-dark gray and weather to various shades of brown and gray, and range from finely crystalline and equigranular to very coarsely crystalline and porphyritic. These rocks form relatively barren topographic prominences characterized by blocky rubble fields and less commonly by tors. Tertiary and/or Cretaceous age is speculative and based on analogies with similar granitic intrusive rocks of these ages in other parts of central interior Alaska. Presumably the granitic rocks are penecontemporaneous with, or slightly older than, the 3 units of felsic, rhyolitic and andesitic rocks.

TRm DIABASE AND BASALT.--Generally light to medium green and weathered to various shades of yellowish brown, reddish brown and brown. Diabase is medium to coarse grained, and in part porphyritic; very hard, and breaks into angular blocks. Basalt is very fine grained to aphanitic, generally not as hard as diabase and more finely fractured. A minor amount of green to greenish gray shale and argillite, possibly tuffaceous, occurs in thin layers associated with the basalt. Unit forms abundant outcrops and rubble in the high part of Chitanatala Mountains, but the northeastward extension of this unit is largely obscured by cover, and mapping is speculative based on aerial interpretation and one suboutcrop of basalt fragments. Triassic age is tentative and is inferred from the similarity of this unit to parts of the volcanic and intrusive mafic rocks, argillite, slate and chert unit (TRPv) in the Tanana quadrangle (Chapman and Yeend, 1972) and elsewhere in interior Alaska. A syenite dike intrudes the basalt, and, if this dike is related to the syenite (sy in TKg) about 6 miles north, the diabase and basalt must be older than unit TKg. The contact between this diabase and basalt unit and the adjoining rock units (TKf, TKg, Dls and KJgs) was not seen.

UNIDENTIFIED ROCKS

bu BEDROCK OF UNKNOWN TYPE OR AGE.--Includes rubble of metasiltstone and chert, believed to be older than surrounding felsic extrusive rocks and tuff (TKf) near south end of Chitanatala Mountains, and a small outcrop of white, very fine grained quartz sandstone on south bank of North Fork Kuskokwim River; these rocks could not be satisfactorily correlated with the field mapping units. All of the other areas were identified as bedrock or probable bedrock from aerial observations or air-photo interpretation, but were not examined on the ground and the rock type could not be interpreted with any degree of assurance.

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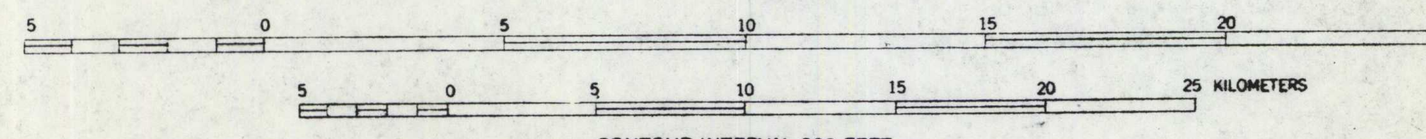
U.S. Geological Survey, 1972, Geological Survey research 1972: U.S. Geol. Survey Prof. Paper 800-A, p. A51-A52.

This map is preliminary and has not been reviewed for conformity with U.S. Geological Survey standards and nomenclature.

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D.C.

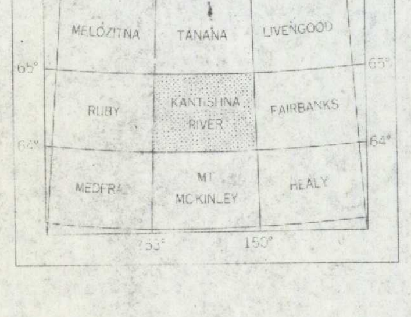
MAPPED, EDITED, AND PUBLISHED BY THE GEOLOGICAL SURVEY

SCALE 1:250000



CONTOUR INTERVAL 200 FEET
DOTTED LINES REPRESENT 100-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

LOCATION INDEX



ROAD CLASSIFICATION
IMPROVED DIRT
TRAILS

KANTISHNA RIVER, ALASKA
1952

PRELIMINARY RECONNAISSANCE GEOLOGIC MAP OF THE WESTERN HALF OF KANTISHNA RIVER QUADRANGLE, ALASKA

BY

ROBERT M. CHAPMAN, WARREN E. YEEND, AND WILLIAM W. PATTON, JR.

1975